

REMARKS

In response to the objection to claims 9, 11 and 13, the formula for gadolinium oxide has been corrected by the insertion of the appropriate subscripts.

Claims 9-12 were rejected under 35 U.S.C. §102(b) as being anticipated by Komiya et al. (Komiya)

Reconsideration is requested.

The claims of the present application are denominated in "mass% of Al₂O₃" while the composition of Komiya is defined in terms of weight % of Al(PO₃)₃ etc. This makes it impossible to directly compare the composition of Komiya with the claimed composition. For this reason, the compositions of the ingredients of the examples of Komiya have been converted to mass% on the attached tables for purposes of comparison.

In the glasses of the present invention, the Examiner has urged that the glasses of claims 9 and 11 of the present application are anticipated by Examples 5-12 and 15-20 of Komiya.

The MgF₂, CaF₂, SrF₂ and BaF₂ ingredients are effective for preventing devitrification of the glass and the proper total amount of one or more of these ingredients is 30 – 70 mass% as pointed out in claims 9, 11 and 13. In contrast, the total amount of these ingredients in Examples 5, 6, 8 – 12, 15 – 20 of Komiya is less than 30 mass %.

Further, in the present invention Gd₂O₃ is effective for increasing refractive index without decreasing the Abbe number, preventing occurrence of devitrification and improving chemical properties of the glass. If the amount of this ingredient exceeds 20%, it is undesirable because resistivity to devitrification is deteriorated and, therefore, the upper limit of this ingredient is 20% in the claims before the Examiner. In contrast, Example 7 of Komiya comprises Gd₂O₃ in the amounts of 23.85 mass% which is outside the range of this ingredient in the present invention.

An advantage derived from a certain ingredient of glass and an amount of the ingredient required for obtaining such advantage are determined by relationship of this ingredient with other ingredients of the glass. Komiya does not disclose or even suggest a structure which satisfies the composition of all ingredients of the glass of the present invention. For these reasons, the Komiya patent fails to anticipate claims 9, 11 or 13 and it is requested that this ground of rejection be withdrawn.

Claims 9-12 were rejected under 35 U.S.C. §102(b) as being anticipated by Otsuka et al.(Otsuka).

Reconsideration is requested.

The claims of the present application point out the invention in terms of mass % while the Otsuka patent uses mol% to define the invention. Since these units may not be compared, the applicant has attached conversion tables which show the equivalent of the Otsuka compositions in terms of mass%. The Examiner stated that the glasses of claims 9 and 11 of the present invention were anticipated by Examples 1, 2, 6, 8 – 13 and 15 of Otsuka. In response claims 9 and 11 have been amended to point out that the amount of NaF is 0.1mass% which is less than the minimum of 0.15mass % as disclosed in Example 15 of Otsuka . It is noted that Claim 13 points out a composition having an Abbe number within a range of 95.1 -97.1 while Otsuka are limited to compositions having an Abbe number of 75-90.

For these reasons, the Otsuka patent fails to anticipate claims 9-12 and it is requested that this ground of rejection be withdrawn.

Claims 13-14 were rejected under 35 U.S.C. §102(b) as being anticipated by Nozawa.

Reconsideration is requested.

Since the composition of the glasses of Nozawa is defined in weight%, the composition of the glasses disclosed by Nozawa may not be compared with the compositions of the glasses defined by the claims of the present application which are in units of mass%. The attached chart includes a conversion of the composition of Nozawa's glasses the compositions of Nozawa may be compared with the glasses of the present claims. In converting KPF₆ and BaSiF₆ in Example 26 of TABLE 2, two methods have been employed. One method is based on a conversion to oxides, namely converting KPF₆ to K₂O and P₂O₅ and converting BaSiF₆ to BaO and SiO₂. The other method is based on a conversion to fluorides, namely converting KPF₆ to KF and PF₅ and BaSiF₆ to BaF₂ and SiF₄.

The Examiner stated that the glass of claim 13 of the present invention is anticipated by Example 26 of Nozawa. In view of the Examiner's comment, we have amended claims 13 to point out 0-28.30 mass% of aluminum trifluoride which is present to decrease dispersion of the glass and to prevent devitrification. In contrast, the glass of Example 26 of Nozawa comprises AlF₃ in an amount between 29.00% and 29.49% which outside of the range of this ingredient in amended claim 13..

For the above reason, the glass of claim 13 of the present invention is not anticipated by Nozawa and it is requested that this ground of rejection be withdrawn.

An early and favorable action is earnestly solicited.

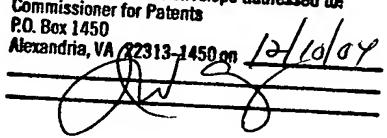
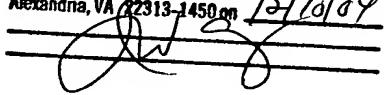
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Kurnia
Conversion of Examples

wt%

MW	6	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
nd	1.56527	1.56527	1.56242	1.54574	1.57211	1.57484	1.57474	1.55276	1.57211	1.57484	1.54122	1.53300	1.47708	1.57274		
y.d	73.9	71.6	70.0	71.6	70.1	70.2	70.7	71.6	69.1	69.0	74.0	69.2	74.1	71.5		
AlPO ₄	268.897	30.0	20.0	20.0	17.0	20.0	25.0	25.0	17.6	20.0	30.0	17.0	24.0	18.0	24.0	
Ba ₂ PO ₄	350.271				10.0											
Ca ₂ PO ₄	146.664								8.0							
Ca ₂ PO ₄	158.022															
Na ₂ PO ₄	162.349															
BaF ₂	175.924	45.0	40.0	35.0	22.0	30.0	37.0	39.0	51.6	60.0	60.0	22.0	36.0	23.8	41.0	
BaF ₂	125.817	20.0	20.0	20.0	19.0	25.0	24.0	27.0	14.4	5.0	5.0	19.0	20.0	14.4	20.0	
CaF ₂	78.076				15.0					12.0			10.0			
MgF ₂	62.302				6.0					6.4			6.0			
AlF ₃	45.977				5.0											
GdF ₃	214.246								1.0							
Gd ₂ O ₃	362.446	2.0	15.0	20.0	16.0	5.0	10.0	6.0	15.0	15.0	6.0	15.0	16.0	8.0		
La ₂ O ₃	323.509							3.0								
Y ₂ O ₃	226.810							10.0								
Yb ₂ O ₃	354.078							10.0								
total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
MgF ₂ -CaF ₂																
AlF ₃ -BaF ₂	65.0	60.0	55.0	58.0	60.0	60.0	60.0	60.0	65.0	60.0	58.0	61.0	56.6	61.0		

mol

MW	6	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
nd	1.56531	1.56527	1.56529	1.54574	1.57211	1.57484	1.57474	1.55276	1.57211	1.57484	1.54122	1.53300	1.47708	1.57274		
y.d	73.9	71.6	70.0	71.6	70.1	70.2	70.7	71.6	69.1	69.0	74.0	69.2	74.1	71.5		
AlPO ₄	268.897	0.1137	0.0758	0.0758	0.0644	0.0547	0.0547	0.0547	0.0567	0.0558	0.1137	0.0544	0.1137	0.0705	0.0909	
Ba ₂ PO ₄	350.271				0.0559											
Ca ₂ PO ₄	146.664								0.0326							
Ca ₂ PO ₄	158.022															
Mg ₂ PO ₄	152.246															
BaF ₂	175.924	0.2507	0.2241	0.1988	0.1255	0.1998	0.2110	0.1785	0.1460	0.3122	0.3422	0.1335	0.1936	0.1472	0.2539	
BaF ₂	125.817	0.1592	0.1592	0.1692	0.1035	0.1990	0.1831	0.2149	0.1146	0.0398	0.0398	0.1532	0.1146	0.1592		
CaF ₂	78.076					0.1264			0.1027			0.1284			0.1637	
MgF ₂	62.302														0.1027	
AlF ₃	45.977				0.0595											
GdF ₃	214.246	0.0233							0.0017							
Gd ₂ O ₃	362.446	0.0138	0.0414	0.0552	0.0414	0.0134	0.0276	0.0198	0.0414	0.0414	0.0138	0.0414	0.0414	0.0414	0.0021	
La ₂ O ₃	323.509						0.0158								0.0061	
Y ₂ O ₃	226.810							0.0445							0.0089	
Yb ₂ O ₃	354.078						0.0224								0.0078	
total	0.5	0.5	0.5	0.7	0.6	0.5	0.6	0.7	0.6	0.5	0.7	0.5	0.7	0.5	0.5	
P	18.9984	0.8818	0.8447	0.5983	1.095	0.7973	0.7781	0.8063	1.0442	0.7841	0.7641	1.0395	0.7177	1.0554	0.7841	

part of weight

MW	6	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
nd	1.56531	1.56527	1.56242	1.54574	1.57211	1.57484	1.57474	1.55276	1.57211	1.57484	1.54122	1.53300	1.47708	1.57274		
y.d	73.9	71.6	70.0	71.6	70.1	70.2	70.7	71.6	69.1	69.0	74.0	69.2	74.1	71.5		
P ₂ O ₅	141.948	24.25	16.14	16.14	18.52	18.52	18.52	18.52	17.17	20.17	18.02	16.14	24.20	18.50	19.36	
Al ₂ O ₃	101.981	5.80	3.66	3.88	3.28	4.69	4.83	4.83	4.40	3.86	5.80	3.28	3.80	8.59	4.84	
BaO	187.276															
BrO	103.619															
MgO	46.077															
AlF ₃	176.824	45.00	40.00	35.00	22.00	35.00	37.00	38.00	25.00	30.00	60.00	22.00	36.00	26.80	41.00	
BaF ₂	125.817	20.00	20.00	18.00	26.00	24.00	27.00	11.40	0.00	3.00	13.00	20.00	14.40	20.00		
CaF ₂	78.076				16.00				12.00			15.00		12.00		
MgF ₂	62.302				8.00				8.40			8.00		6.40		
AlF ₃	214.246	5.00							1.00							
Gd ₂ O ₃	362.446	5.00	16.00	21.00	16.00	16.00	5.00	5.00	13.00	5.00	16.00	15.00	5.00	6.00		
La ₂ O ₃	323.509						5.00									
Y ₂ O ₃	226.810							10.00								
Yb ₂ O ₃	354.078								10.00						3.00	
total	15.6	15.9	18.9	81.5	79.8	79.8	81.2	83.9	75.6	78.6	75.6	78.3	80.6			
P	18.9984	16.802	16.049	17.026	20.878	16.147	14.978	15.519	15.013	14.518	14.516	20.870	15.021	14.601	14.935	

mass%

MW	6	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
nd	1.56887	1.56879	1.56872	1.56374	1.56231	1.56748	1.56747	1.56276	1.56744	1.56747	1.56122	1.55350	1.56703	1.57274		
y.d	73.9	71.8	70.0	71.6	70.1	70.2	70.7	71.6	69.1	69.0	74.0	69.2	74.1	71.5		
P ₂ O ₅	141.948	18.94	19.24	19.24	26.27	26.27	26.27	26.27	18.97	18.97	18.94	18.93	27.40	18.93	28.10	28.01
Al ₂ O ₃	101.981	17.65	17.65	17.65	17.65	17.65	17.65	17.65	17.65	17.65	17.65	17.65	17.65	17.65	17.65	
BaO	183.192				8.37				6.05	8.06	4.19	4.11	7.80	1.07	4.02	4.76
CaO	103.619															
CaO	66.077															
MgO	40.304															
BaF ₂	176.824	69.37	47.70	47.70	27.00	53.84	48.83	42.84	31.64	71.54	79.16	64.03	48.18	22.47	30.82	
BaF ₂	125.817	27.00	23.88	16.96	51.08	28.31	32.82	17.74	6.96	6.60	16.08	26.30	18.12	24.60		
CaF ₂	78.076				18.41				1.78				19.11	10.10		
MgF ₂	62.302				9.84				7.04				10.18	9.06		
AlF ₃	214.246	8.06							1.23							
Gd ₂ O ₃	362.446	6.60	17.89	22.85	13.41	6.36	12.69	8.26	16.48	17.30	6.50	18.11	19.79	18.85	9.92	
La																

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Otsuka
Conversion of Examples
ml%

	MW	1	2	6	8	9	10	11	12	13	15
nd		1.5054	1.5097	1.5116	1.5011	1.5015	1.5058	1.5181	1.5037	1.4950	1.5304
v d		81.0	80.7	79.3	82.1	82.9	82.8	79.3	82.0	82.8	77.0
P ₂ O ₅	141.945	14.5	12.1	14.7	11.5	13.6	16.5	12.4	11.6	13.4	17.4
Al ₂ O ₃	101.961	3.6	1.6	3.5	3.5	4.9	5.1	9.8	3.3	4.1	4.6
BnO	153.326	1.0	6.6	2.2	1.0	0.8	1.2	0.7	1.1	1.2	3.8
AlF ₃	88.977	22.0	22.8	19.0	22.3	16.6	17.8	23.0	19.7	17.8	16.8
MgF ₂	62.302	7.0	3.0	15.0	6.7	4.8	3.9	3.7	4.6	3.9	3.2
CaF ₂	78.076	14.0	10.5	15.0	10.5	10.5	8.9	14.3	8.4	8.3	8.0
SrF ₂	126.617	20.0	17.3	11.6	20.6	25.3	13.0	12.4	11.2	32.7	20.2
BaF ₂	176.824	12.0	19.2	12.1	18.1	18.3	29.9	23.4	33.9	13.5	21.4
NnF	41.988	0.5	1.0	2.4	1.5	1.1	3.2	1.3	1.6	3.2	0.5
GdF ₃	314.246				0.9						
Cd ₂ O ₃	862.498	2.5	3.0	2.5	3.4	1.2	1.1	5.5	3.6	1.9	4.2
Y ₂ O ₃	225.810					3.6					
Yb ₂ O ₃	394.078				2.0						
CaO	56.077	3.0									
MgO	40.304	3.0									
total		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

part of weight

	MW	1	3	6	8	9	10	11	12	13	15
nd		1.5054	1.5097	1.5116	1.5011	1.5015	1.5058	1.5181	1.5037	1.4950	1.5304
v d		81.0	80.7	79.3	82.1	82.9	82.8	79.3	82.0	82.8	77.0
P ₂ O ₅	141.946	2058.2	1717.5	2086.6	1632.4	1930.4	2342.1	1780.1	1646.6	1902.1	2469.8
Al ₂ O ₃	101.961	366.9	152.9	356.9	356.9	498.4	520.0	936.5	936.5	418.0	458.8
BaO	163.326	163.3	1012.0	337.3	163.3	122.7	184.0	107.3	260.7	184.0	582.6
AlF ₃	83.977	1847.5	1914.7	1595.6	1872.7	1394.0	1494.8	1931.5	1674.3	1494.8	1410.8
MgF ₂	62.302	496.1	186.9	934.5	417.4	209.0	243.0	230.5	299.0	243.0	199.4
CaF ₂	78.076	1093.0	819.8	1171.1	819.8	819.8	648.0	1116.5	655.8	648.0	624.6
SrF ₂	126.617	2512.3	2173.2	1457.2	2587.7	3178.1	1633.0	1557.6	1405.9	4107.7	2587.5
BaF ₂	176.824	2103.0	3366.2	2121.4	3173.4	3208.4	5242.2	4102.6	5943.5	2368.9	3761.9
NnF	41.988	21.0	42.0	100.8	69.0	46.2	134.4	54.6	75.4	134.4	21.0
CdF ₃	214.246	0.0	0.0	0.0	192.8	0.0	0.0	0.0	0.0	0.0	0.0
Gd ₂ O ₃	362.498	906.2	1087.5	906.2	1232.5	435.0	398.7	1998.7	1305.0	688.7	1522.5
Y ₂ O ₃	225.810	0.0	0.0	0.0	0.0	790.0	0.0	0.0	0.0	0.0	0.0
Yb ₂ O ₃	394.078	0.0	0.0	788.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CaO	56.077	168.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MgO	40.304	0.0	120.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
total		#####	#####	#####	#####	#####	#####	#####	#####	#####	#####
F	18.9984	3277.2	9218.9	3168.9	3474.8	9206.0	3168.9	3579.8	3372.2	3294.3	2979.9

mass%

	MW	1	2	6	8	9	10	11	12	13	15
nd		1.5054	1.5097	1.5116	1.5011	1.5015	1.5058	1.5181	1.5037	1.4950	1.5304
v d		81.0	80.7	79.3	82.1	82.9	82.8	79.3	82.0	82.8	77.0
P ₂ O ₅	141.945	17.68	13.64	17.60	13.06	10.25	18.24	13.34	12.12	15.61	18.19
Al ₂ O ₃	101.961	3.06	1.21	3.01	2.85	3.46	4.05	2.55	2.48	3.43	3.58
BnO	153.326	1.32	8.04	2.85	1.23	0.97	1.43	0.81	1.92	1.51	4.29
AlF ₃	83.977	15.85	15.20	13.46	14.98	11.01	11.64	14.64	12.13	12.26	10.39
MgF ₂	62.302	3.74	1.48	7.88	3.34	2.36	1.89	1.75	2.20	1.99	1.47
CaF ₂	78.076	9.38	6.61	9.88	6.56	6.47	6.06	8.46	4.83	5.32	4.60
SrF ₂	126.617	21.65	17.26	12.29	20.70	25.10	12.72	11.81	10.94	33.70	18.69
BaF ₂	176.824	18.06	26.73	17.89	25.38	26.34	40.83	31.10	43.76	19.42	27.63
NnF	41.988	0.18	0.39	0.85	0.50	0.36	1.05	0.41	0.66	1.10	0.16
CdF ₃	214.246	0.00	0.00	0.00	1.54	0.00	0.00	0.00	0.00	0.00	0.00
Gd ₂ O ₃	362.498	7.77	8.61	7.64	9.86	3.44	9.11	15.11	9.61	6.66	11.21
Y ₂ O ₃	225.810	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Yb ₂ O ₃	394.078	0.00	0.00	6.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CaO	56.077	1.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MgO	40.304	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
total		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
F	18.9984	28.1	25.6	26.7	27.8	25.3	24.7	25.6	24.8	27.0	21.9

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Nozawa
Conversion of Example 26

	MW	26
nd		1.43937
v d		95.3
KPF ₆	184.062	2.00
BaSiF ₆	279.408	4.00
AlF ₃	80.977	29.00
YF ₃	145.801	3.00
MgF ₂	62.302	4.00
CaF ₂	78.076	15.00
SrF ₂	125.917	11.00
BaF ₂	175.824	28.00
P ₂ O ₅	141.945	4.00
total		100.0
F	18.998	

When all of KPF₆ and BaSiF₆ was converted into oxide. -->26-a
When all of KPF₆ and BaSiF₆ was converted into fluoride. -->26-b

	MW	26-a	26-b
nd		1.43937	1.43937
v d		95.3	95.3
P ₂ O ₅	141.945	0.034	0.038
PF ₆	126.966		0.011
K ₂ O	94.196	0.005	
KF	68.097		0.011
BaO	163.928	0.014	
BaF ₂	175.824	0.160	0.174
SiO ₂	60.084	0.014	
SiF ₄	104.079		0.014
AlF ₃	88.977	0.345	0.345
YF ₃	145.901	0.021	0.021
MgF ₂	62.302	0.064	0.064
CaF ₂	78.076	0.192	0.192
SrF ₂	125.817	0.088	0.088
total		0.937	0.948
F	18.998	2.103	2.258

	MW	26-a	26-b
nd		1.43937	1.43937
v d		95.3	95.3
P ₂ O ₅	141.945	4.771	4.000
PF ₆	126.966	0.000	1.280
K ₂ O	94.196	0.512	0.000
KF	68.097	0.000	0.631
BaO	163.928	2.195	0.000
BaF ₂	175.824	28.000	30.510
SiO ₂	60.084	0.880	0.000
SiF ₄	104.079	0.000	1.490
AlF ₃	88.977	29.000	29.000
YF ₃	145.901	3.000	3.000
MgF ₂	62.302	4.000	4.000
CaF ₂	78.076	16.000	16.000
SrF ₂	125.817	11.000	11.000
total		98.338	100.000
F	18.998	39.989	42.880

	MW	26-a	26-b
nd		1.43937	1.43937
v d		95.3	95.3
P ₂ O ₅	141.945	4.85	4.00
PF ₆	126.966	0.00	1.87
K ₂ O	94.196	0.52	0.00
KF	68.097	0.00	0.68
BaO	163.928	2.28	0.00
BaF ₂	175.824	28.47	30.51
SiO ₂	60.084	0.87	0.00
SiF ₄	104.079	0.00	1.49
AlF ₃	88.977	29.49	29.00
YF ₃	145.901	5.05	5.00
MgF ₂	62.302	4.07	4.00
CaF ₂	78.076	15.26	15.00
SrF ₂	125.817	11.19	11.00
total		100	100
F	18.998	40.67	42.86

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